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EXAMINER	
HUGHES, SCOTT A	
ART UNIT	**PAPER NUMBER**
3663	

DATE MAILED: 03/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/623,904	WELKER ET AL.	
	Examiner	Art Unit	
	Scott A Hughes	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-4,7-17,19-24,26-29,31-34 and 36* is/are rejected.

7)☒ Claim(s) *5,6,18,23-25,30 and 35* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

The second claim numbered "Claim 23" is objected to because of the following informalities: The current claims contain two claims numbered "Claim 23." Since there is no "Claim 24," the claims are examined as if the second "Claim 23" is claim 24. Appropriate correction to the numbering of the claims so there is one claim 23 and one claim 24 is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 31and 36 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 31and 36 recite the limitation "the plurality of orientation sensors" in last line of the claim. There is insufficient antecedent basis for this limitation in the claims.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 7, 9, 13-17, 19-24, 26, 28-29, 31, 33-34, and 36 are rejected under 35 U.S.C. 102(e) as being anticipated by Bittleston.

With regard to claims 1, 28-29, and 33-34 Bittleston discloses a method, machine-readable storage media containing instructions that enable a processor to carry out the method, and an apparatus for performing the method ([0023]). Bittleston discloses a method comprising determining at least one initial inclination of at least one orientation sensor coupled to a seismic cable. Bittleston discloses determining at least one current inclination of the at least one orientation sensor. Bittleston discloses determining whether the at least one seismic cable has moved from a comparison of the at least one initial inclination and the at least one current inclination ([0025] to [0028]). Bittleston discloses continuously determining the angular position and inclination of the streamer, and comparing them to a desired position [0028]. In doing so, the system of Bittleston would continuously calculate whether or not the seismic cable has moved between measurements because it would compare each one to the desired position.

With regard to claim 2, Bittleston discloses re-positioning the cable in response to determining that the cable has moved ([0025]).

With regard to claim 3, Bittleston discloses that re-positioning the cable comprises performing a cable position determination operation ([0023]-[0025]).

With regard to claim 4, Bittleston discloses that re-positioning the cable comprises physically moving the seismic cable ([0025], [0028]).

With regard to claim 7, Bittleston discloses performing a seismic sensing operation in response to determining that the at least one cable has not moved ([0006]).

With regard to claim 9, Bittleston discloses at least one seismic sensor coupled to the seismic cable ([0020]).

With regard to claims 13 and 14, Bittleston discloses that determining the current inclination comprises determining the current inclination during a selected time during the seismic survey and at a plurality of selected times during the survey ([0028]). Bittleston discloses that the inclination is recalculated during the survey, which means that it is calculated at a plurality of selected times.

With regard to claim 15, Bittleston discloses that the orientation sensor is an inclinometer 42 (Fig. 2).

With regard to claim 16, Bittleston discloses a system for carrying out a seismic survey. Bittleston discloses at least one seismic cable 14, at least one seismic sensor coupled to the seismic cable, and an orientation sensor coupled to the seismic cable ([0020], [0028]). Bittleston discloses a signal processing unit capable of determining at least one initial inclination of the orientation sensor, determining at least one current inclination of the orientation sensor, and determining whether the seismic cable has moved using the initial and current inclinations ([0026]-[0028]).

With regard to claim 17, Bittleston discloses determining whether the at least one seismic cable has moved from a comparison of the at least one initial inclination and the at least one current inclination ([0025] to [0028]). Bittleston discloses continuously determining the angular position and inclination of the streamer, and comparing them to a desired position [0028]. In doing so, the system of Bittleston would continuously

calculate whether or not the seismic cable has moved between measurements because it would compare each one to the desired position.

With regard to claim 19, Bittleston discloses that the seismic cable includes a plurality of orientation sensors coupled thereto ([0003]), and that comparing the initial inclination and the current inclination comprises comparing a plurality of initial and current inclinations of the plurality of orientation sensors ([0028]).

With regard to claim 20, Bittleston discloses a first survey vessel and discloses that the seismic cable is attached to the survey vessel ([0002]).

With regard to claim 21, Bittleston discloses a survey vessel capable of performing a cable positioning operation ([0002], [0008]).

With regard to claim 22, Bittleston discloses that the cable positioning operation comprises performing a cable position determination operation ([0023]-[0025]).

With regard to claim 23, Bittleston discloses that the cable operation comprises physically moving the seismic cable ([0025], [0028]).

With regard to claim 24 (listed as the second claim 23), Bittleston discloses that the survey vessel is capable of performing the cable positioning operation in response to the signal processing unit determining that the seismic cable has moved ([0027]-[0028]).

With regard to claim 26, Bittleston discloses that the orientation sensor is an inclinometer 42 (Fig. 2). Although Bittleston does not disclose that the inclinometer is a gyroscopic inclinometer, but since he discloses an inclinometer in general, it would be

obvious to use any type of inclinometer that can detect the orientation of the seismic cable.

With regard to claims 31 and 36, Bittleston discloses that the seismic cable includes a plurality of orientation sensors coupled thereto ([0003]), and that comparing the initial inclination and the current inclination comprises comparing a plurality of initial and current inclinations of the plurality of orientation sensors ([0028]).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 7, 9-10, 12-14, 16-17, 19-24, 28-29, 31, 33-34, and 36 are rejected under 35 U.S.C. 103(a) as being obvious over Partridge in view of Entralgo.

With regard to claims 1, 28-29, and 33-34 Partridge discloses a method, machine-readable storage media containing instructions that enable a processor to carry out the method, and an apparatus for performing the method ([Page 2, Acoustics]). Partridge discloses a method comprising determining at least one initial inclination of at least one orientation sensor coupled to a seismic cable. Partridge discloses determining at least one current inclination of the at least one orientation sensor. Partridge discloses determining whether the at least one seismic cable has moved from a comparison of the at least one initial inclination and the at least one

current inclination (Pages 2-3). Partridge discloses acoustic transponders as the positioning devices, and it is known in the art that both cable position and orientation are need to be known before a survey is carried to get data without positioning errors (Entralgo). Therefore, the acoustic transponders of Partridge are orientation sensors. Partridge discloses verifying positions of the cable and determining whether or not it needs to be moved. In doing so, it is inherent to the process to determine initial and final positions of the cable and whether or not the cable has moved in order to find out whether the cable still needs to be repositioned.

With regard to claim 2, Partridge discloses re-positioning the cable in response to determining that the cable has moved (Page 3, System Overview).

With regard to claim 3, Partridge discloses that re-positioning the cable comprises performing a cable position determination operation (Pages 2-4). Partridge discloses that the position determination is performed with acoustic transponders.

With regard to claim 4, Partridge discloses that re-positioning the cable comprises physically moving the seismic cable (Page 3, System Overview).

With regard to claim 7, Partridge discloses performing a seismic sensing operation in response to determining that the at least one cable has not moved (Pages 3-4).

With regard to claim 7, Entralgo discloses performing a seismic operation after it has been determined that the cable has not moved (OBC Sensor Positioning). Entralgo discloses that the sensor position and cable orientation must be determined for each survey. Entralgo discloses time-lapse surveys and confirmation of position, and

therefore the position has first and second values since it must be confirmed. It would have been obvious to modify Partridge to include using the acoustic transponders to determine a position and orientation of the cable before performing surveys, and then moving the cable as necessary (disclosed by Partridge) in order to insure accurate data over time in the seismic surveys.

With regard to claim 9, Partridge discloses at least one seismic sensor coupled to the seismic cable ([0020]).

With regard to claim 10, Partridge discloses that the orientation sensor is coupled to the seismic sensor (Page 2, Acoustics).

With regard to claim 12, Entralgo discloses that determining that the current inclination comprises determining the current inclination after a seismic survey is complete (OBC Sensor Positioning). Entralgo discloses that the position is determined in time-lapse surveys and repeated surveys. If it is performed in repeated surveys, then the position at the end of the survey would be determined before the next survey is begun.

With regard to claims 13 and 14, Partridge discloses that determining the current inclination comprises determining the current inclination during a selected time during the seismic survey and at a plurality of selected times during the survey (page 2, last paragraph).

With regard to claim 16, Partridge discloses a system for carrying out a seismic survey. Partridge discloses at least one seismic cable, at least one seismic sensor coupled to the seismic cable, and an orientation sensor coupled to the seismic cable

(Fig. 2) (Page 1). Partridge discloses a signal processing unit capable of determining at least one initial inclination of the orientation sensor, determining at least one current inclination of the orientation sensor, and determining whether the seismic cable has moved using the initial and current inclinations (pages 2-3).

With regard to claim 17, Partridge discloses that the signal processing unit is capable of determining whether the seismic cable has moved by comparing the initial inclination and the current inclination (Pages 2-4, especially Acoustics, System Overview).

With regard to claim 19, Partridge discloses a plurality of orientation sensors coupled to the seismic cable, and that the signal processing unit is capable of determining whether the cable has moved by comparing a plurality of initial and current inclinations from the plurality of orientation sensors (Fig. 2) (Page 2, Acoustics).

With regard to claim 20, Partridge discloses a first survey vessel and discloses that the seismic cable is attached to the survey vessel (Page 1, Last two paragraphs).

With regard to claim 21, Partridge discloses a survey vessel capable of performing a cable positioning operation (Fig. 2) (Page 1, Last two paragraphs; Page 3, System Overview).

With regard to claim 22, Partridge discloses that the cable positioning operation comprises a cable position determination operation (Pages 2-3).

With regard to claim 23, Partridge discloses that the cable operation comprises physically moving the seismic cable (page 3, System Overview).

With regard to claim 24 (listed as the second claim 23), Partridge discloses that the survey vessel is capable of performing the cable positioning operation in response to the signal processing unit determining that the seismic cable has moved (Page 3, System Overview; Page 6, Case Studies). Partridge discloses that if the cable is determined to have moved, then it will be repositioned and discloses that hydraulic devices aboard survey vessels lay the cable.

With regard to claims 31 and 36, Partridge discloses that the processor compares the initial and current inclinations of a plurality of orientation sensors (Page 2, Acoustics, Fig. 2).

Claims 8 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Partridge in view of Entralgo as applied to claim 1 above, and further in view of Seriff.

With regard to claims 8 and 32, Partridge does not disclose re-calibrating a seismic coupling of the at least one seismic sensor to a floor of a body of water. Partridge discloses repositioning the cable if it is not in the correct position. Seriff discloses that coupling the cable to the bottom is related to the positioning (Column 3, Lines 25-43). It would have been obvious to modify Partridge to ensure a recoupling of the cable to the seafloor after repositioning in order to make sure the noise from the cable is gone and that the seismic sensors are in acoustical contact with the seafloor.

Claims 11 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Partridge in view of Entralgo as applied to claims 1 and 16 above, and further in view of Stephen.

With regard to claims 11 and 27, Partridge does not disclose that the seismic sensor is capable of performing the functions of an orientation sensor. Stephen discloses that the seismic sensor units 1 (Fig. 1) are capable of performing the functions of an orientation sensor (Abstract, Column 2, Line 1 to Column 3, Line 32) (Fig. 4). It would have been obvious to modify Partridge to include using the geophones (page 1, third paragraph) to determine the orientation of the cable as disclosed by Stephen in order to determine the exact position of each sensor at a given time.

Claims 15 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Partridge in view of Entralgo as applied to claims 1 and 16 above, and further in view of Bary.

With regard to claims 15 and 26, Partridge does not disclose that the orientation sensor is a tiltmeter or gyroscopic inclinometer. Bary discloses an orientation sensor that is an inclinometer for use in determining the orientation of underwater sensors [0009]. It would have been obvious to modify Partridge to include an inclinometer as taught by Bary in order to be able to determine the location of the seismic sensors when they are disposed on the ocean bottom.

Allowable Subject Matter

Claims 5, 18, 25, 30, 35 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Woods, who discloses a cable location indicator for underwater cables.

Blair, who discloses an OBC location system.

Zinn, who discloses a method to verify the location of an OBC cable.

Giaser, who discloses coupling a sensor to the ocean bottom.

Carroll, who discloses acoustic positioning of an OBC.

Zajac, who discloses positioning towed arrays.

Orban, who discloses a method for determining the actual position of a sensor in a seismic survey.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A Hughes whose telephone number until April 5th is 703-305-0430. The examiner can normally be reached on monday through friday 8:30 am - 5:00 pm. Starting April 5th, the examiner can be reached at (571) 272-6983.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 703-306-4171. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

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